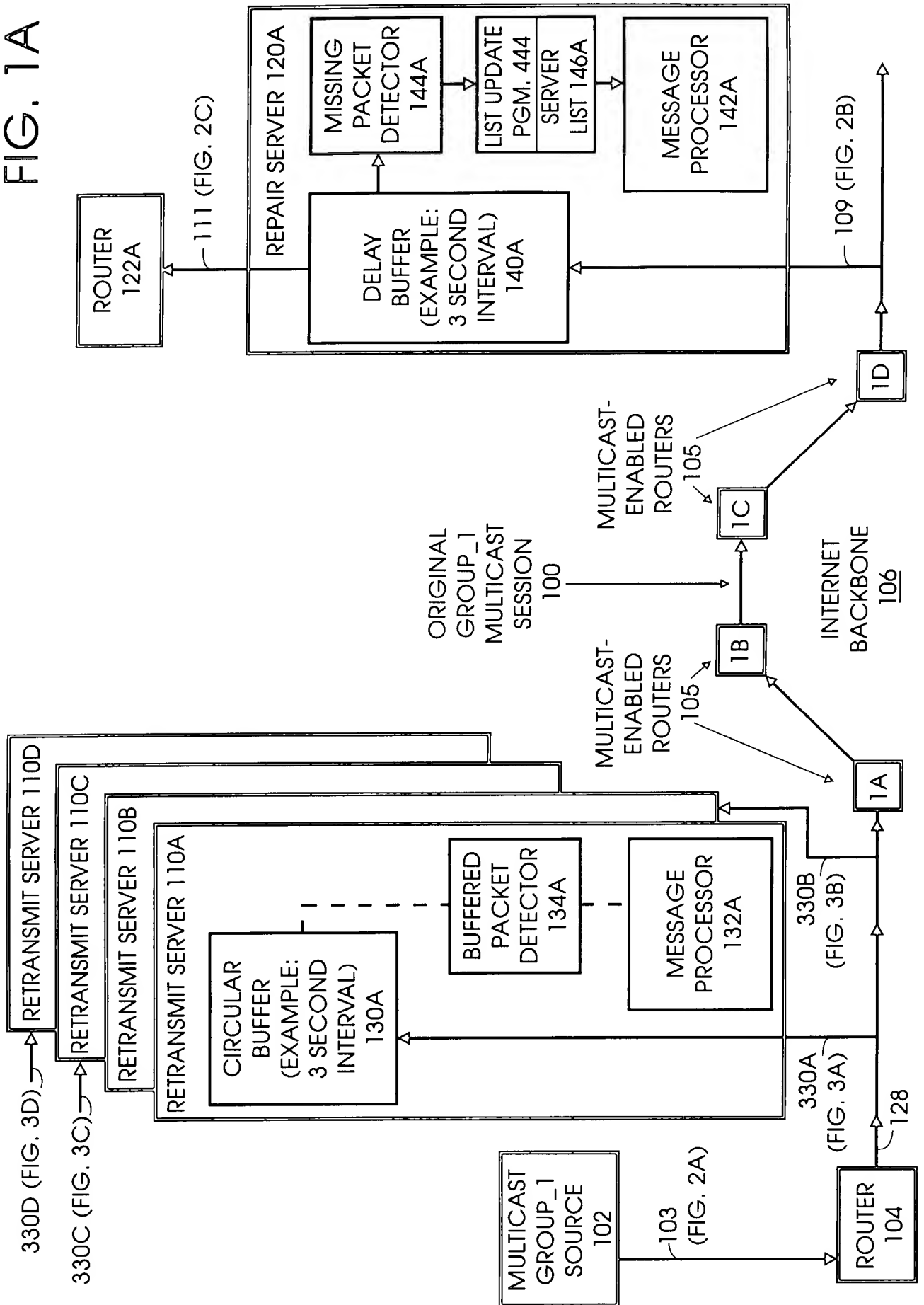


[illegible]

FIG. 1A



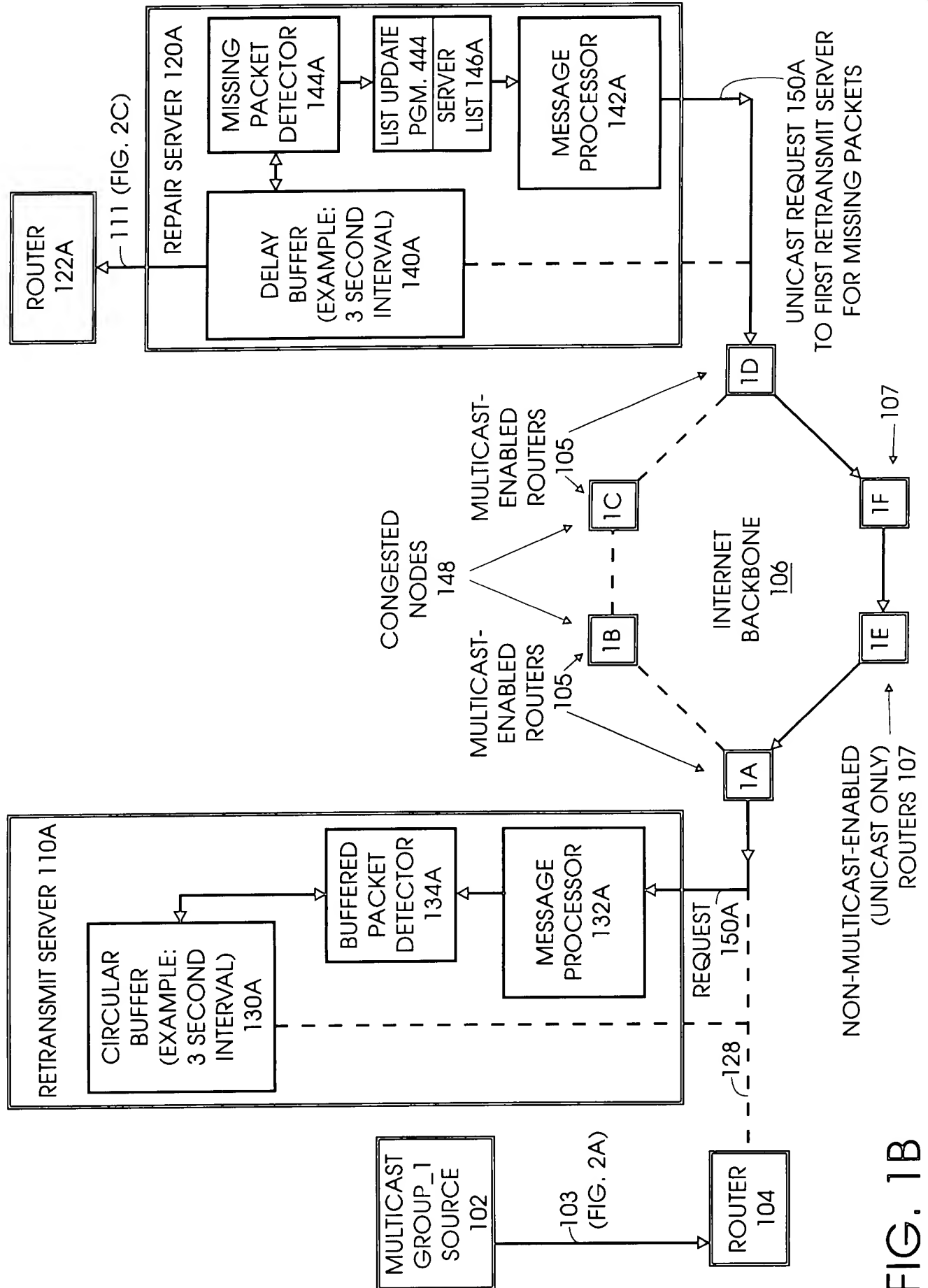


FIG. 1B

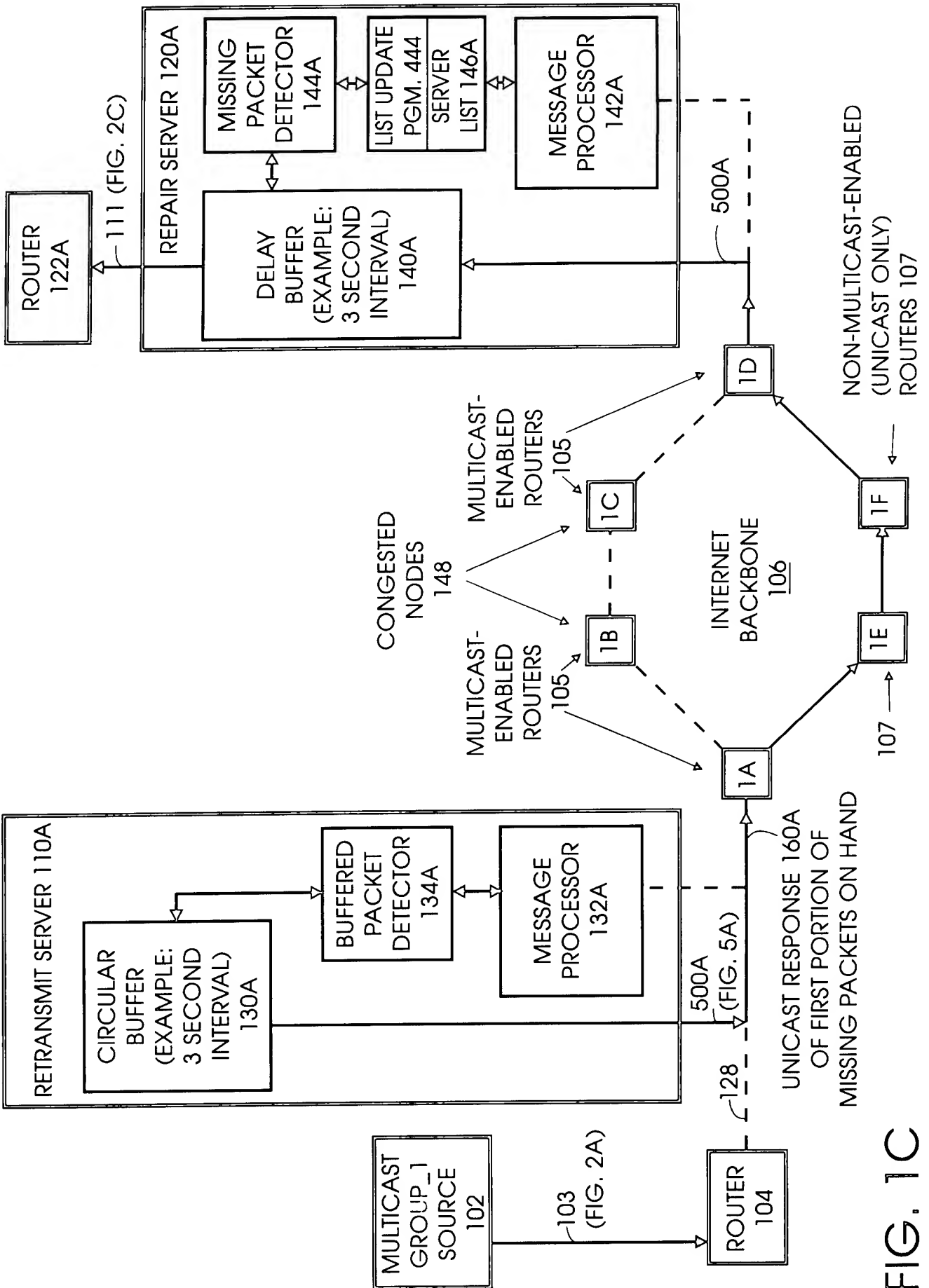


FIG. 1C

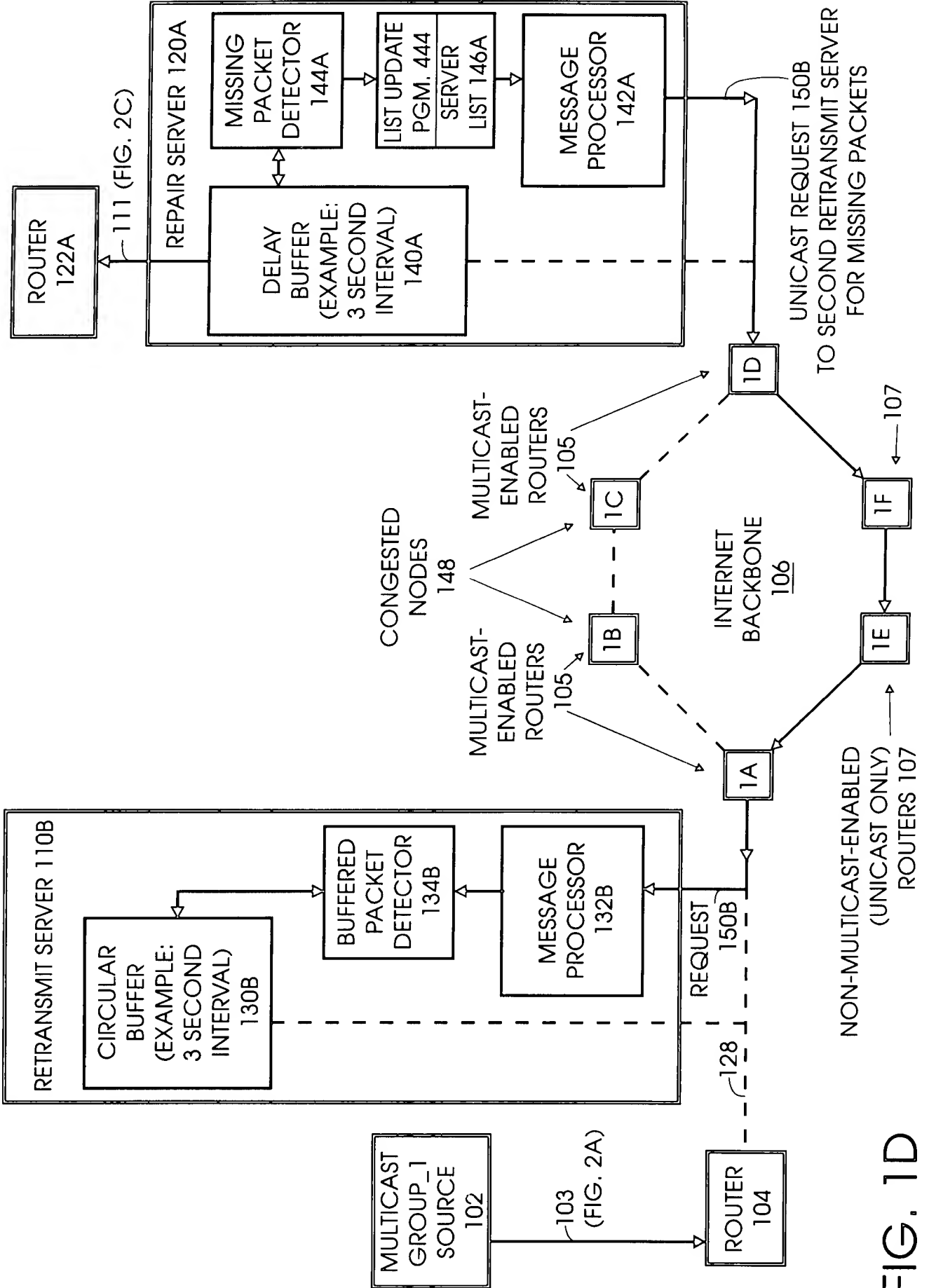


FIG. 1D



W.E.B. DUBOIS

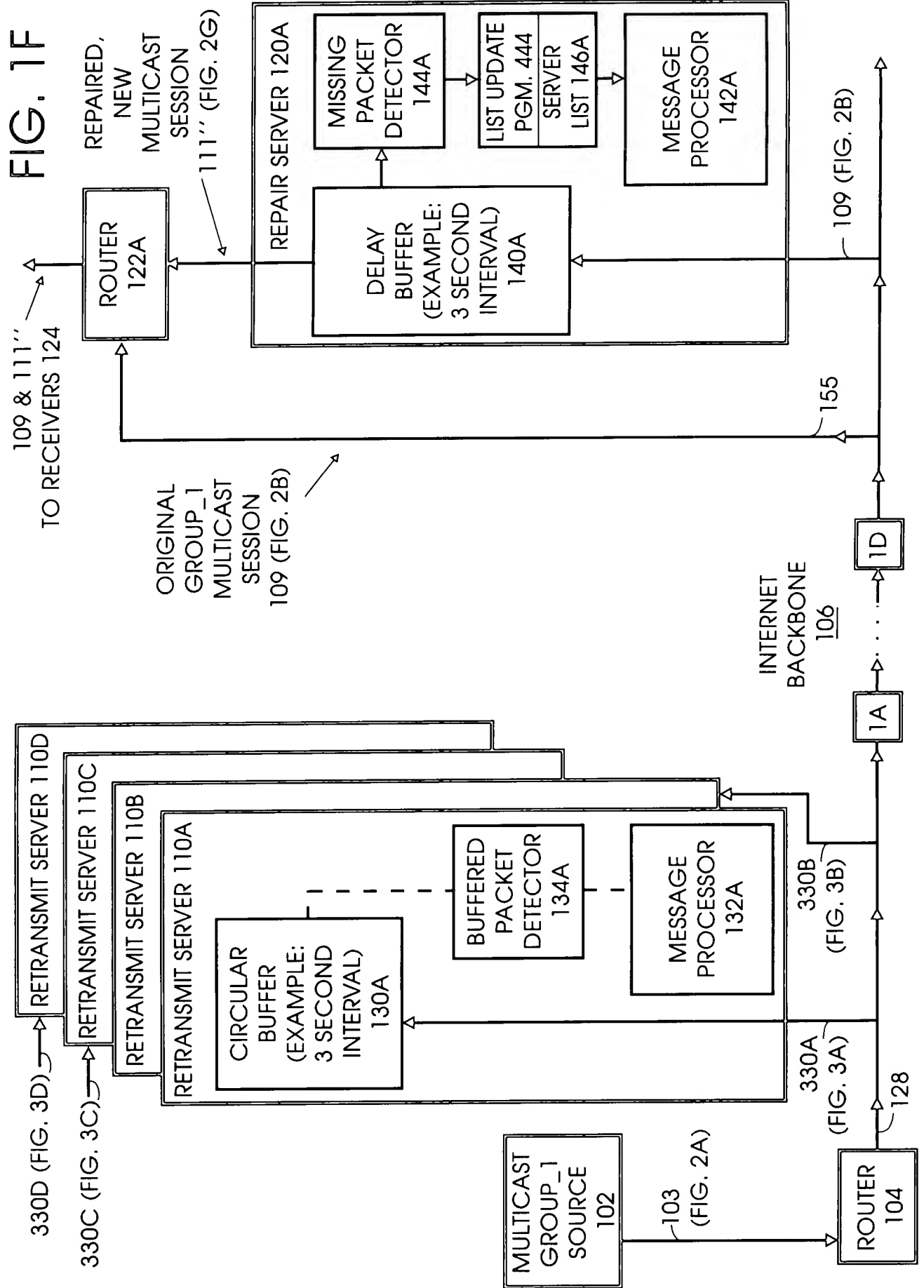


FIG. 1G

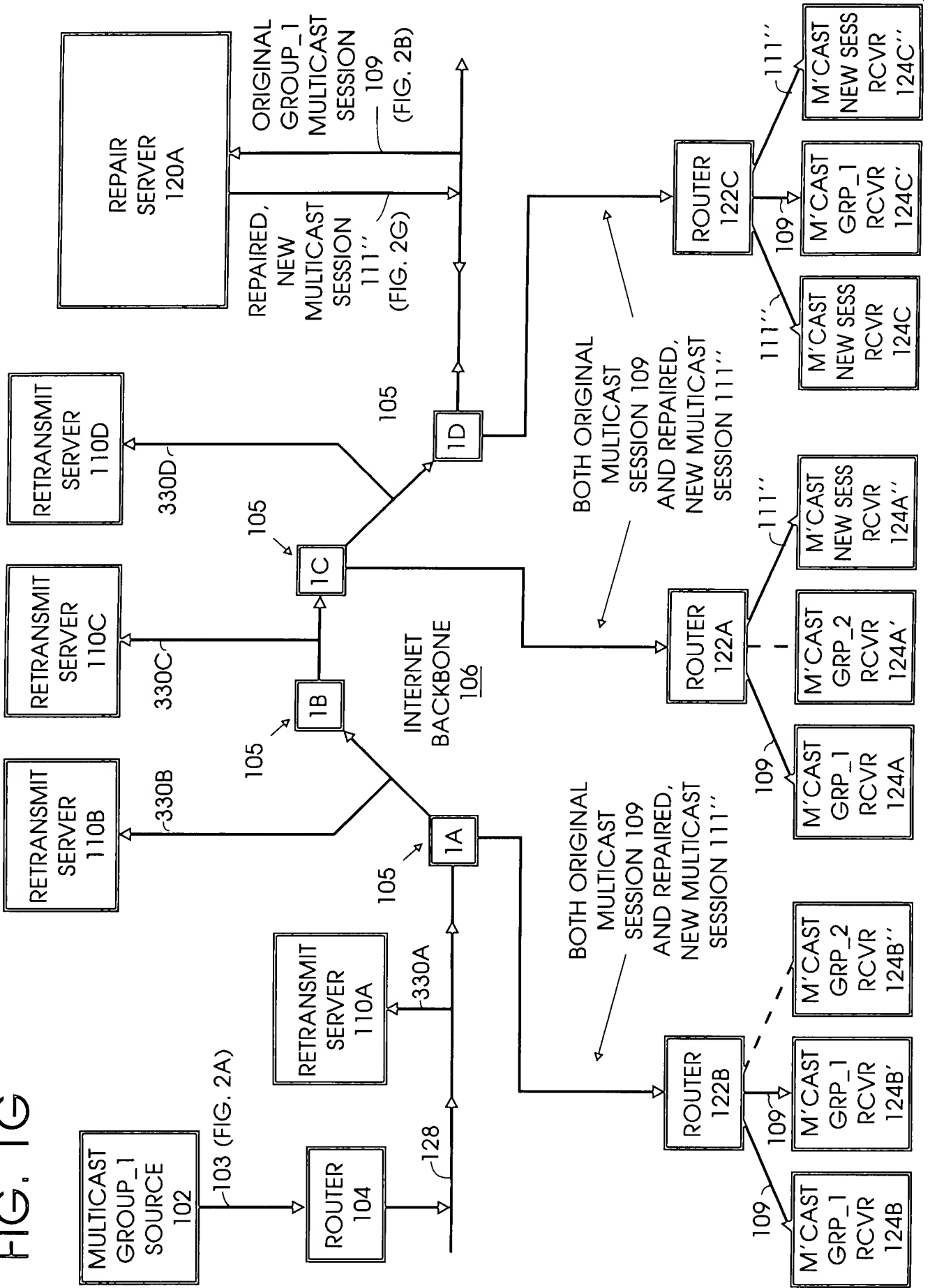


FIG. 1H

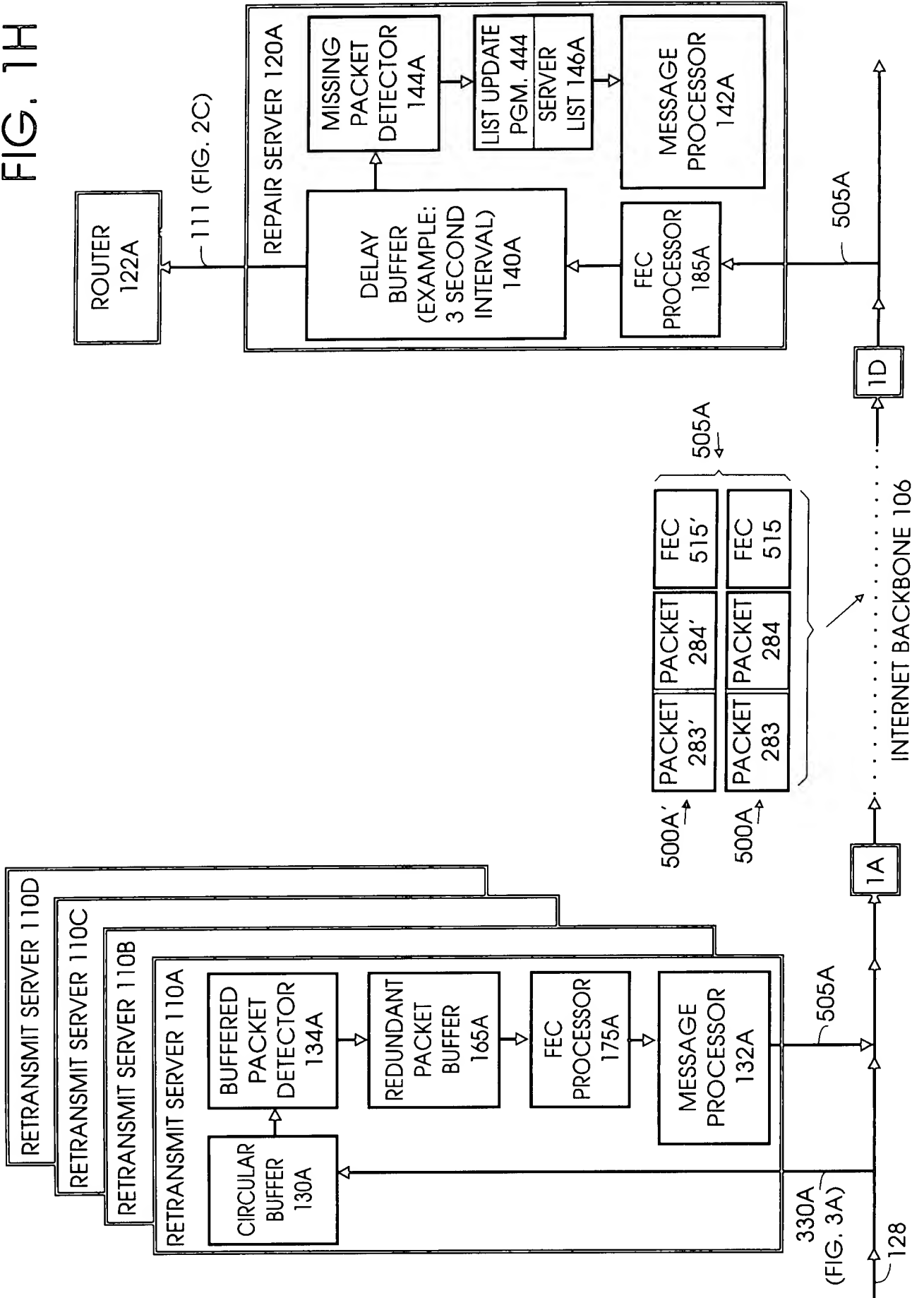


FIG. 2A

PACKETS CURRENTLY BEING OUTPUT BY
MULTICAST GROUP_1 SOURCE 102



IP HEADER				UDP HEADER		RTP MESSAGE		
○○	SOURCE IP ADDRESS	DESTINATION IP ADDRESS	IP OPTIONS	SOURCE PORT	DEST. PORT	SEQUENCE NUMBER	TIME STAMP	DATA
	RETRANS. SERVER 110A	MULTICAST GROUP_1 ADDRESS		CIRC. BUFFER 130A	DELAY BUFFER 140A			

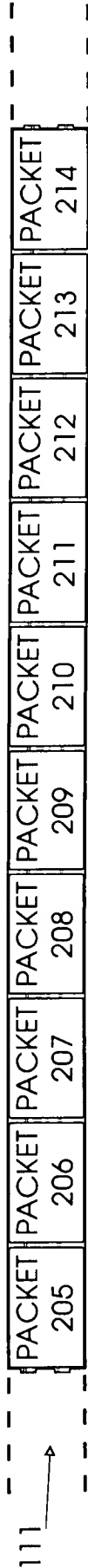
PACKET 285

FIG. 2B



↑
PACKETS CURRENTLY BEING DELIVERED TO DELAY BUFFER 140A

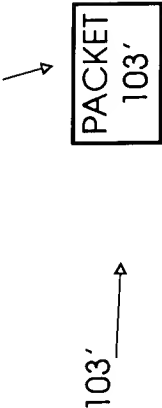
FIG. 2C



↑
PACKETS CURRENTLY BEING DELIVERED TO ROUTER 122A
WITH A 3-SECOND DELAY

FIG. 2D

RTCP SOURCE DESCRIPTION PACKET PERIODICALLY OUTPUT BY
MULTICAST GROUP_1 SOURCE 102

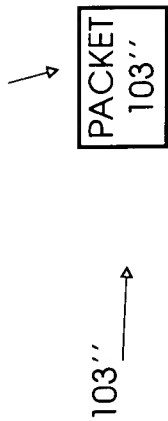


IP HEADER				UDP HEADER		RTCP SOURCE DESCRIPTION					
o o	SOURCE IP ADDRESS	DESTINATION IP ADDRESS	IP OPTIONS	SOURCE PORT	DEST. PORT	CNAME	TOOL	NOTE			
	RETRANS. SERVER 110A	MULTICAST GROUP_1 ADDRESS		MSG. PROC. 132A	MSG. PROC. 142						
					o o				GROUP_1 SOURCE 102	MPEG2	"VOICE TRACK IS 5 CHANNELS"

PACKET 103' →

FIG. 2E

RTCP SENDER REPORT PACKET PERIODICALLY OUTPUT BY
MULTICAST GROUP_1 SOURCE 102



IP HEADER			UDP HEADER		RTCP SENDER REPORT		
o o	SOURCE IP ADDRESS	DESTINATION IP ADDRESS	SOURCE PORT	DEST. PORT	o o	SENDER'S ID	SENDER'S PACKET COUNT
	RETRANS. SERVER 110A	MULTICAST GROUP_1 ADDRESS	MSG. PROC. 132A	MSG. PROC. 142		GROUP_1 SOURCE 102	290
							SENDER'S OCTET COUNT 290,000

PACKET 103'' →

FIG. 2F

REPAIRED MULTICAST SESSION 111'
WHICH APPEARS TO RECIPIENT RECEIVERS 124A
TO BE THE SAME MULTICAST GROUP_1 SESSION
FROM SOURCE 102

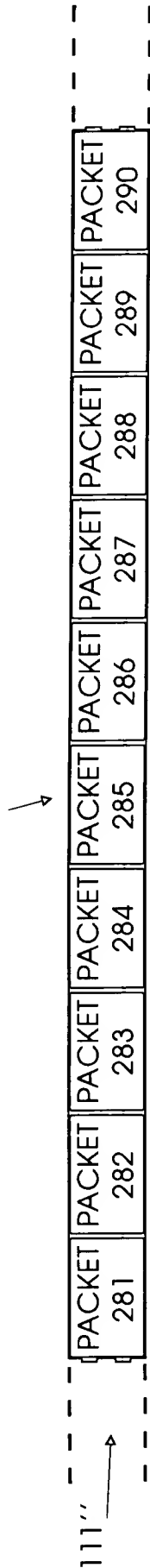


IP HEADER			UDP HEADER		RTP MESSAGE		
○ ○	SOURCE IP ADDRESS	DESTINATION IP ADDRESS	SOURCE PORT	DEST. PORT	SEQUENCE NUMBER	TIME STAMP	DATA
	REPAIR SERVER 120A	MULTICAST GROUP_1 ADDRESS	DELAY BUFFER 140A	RCVR 124	285	090235	

PACKET 285

FIG. 2G

REPAIRED MULTICAST SESSION 111''
WHICH HAS A DIFFERENT MULTICAST ADDRESS THAN
THAT OF THE ORIGINAL GROUP_1 SESSION FROM SOURCE 102



IP HEADER			UDP HEADER		RTP MESSAGE		
	SOURCE IP ADDRESS	DESTINATION IP ADDRESS		SOURCE PORT	DEST. PORT	SEQUENCE NUMBER	TIME STAMP
0 0	REPAIR SERVER 120A	REPAIRED MULTICAST SESSION ADDRESS	IP OPTIONS	DELAY BUFFER 140A	RCVR 124	285	090235
					0 0		DATA

PACKET 285

FIG. 3

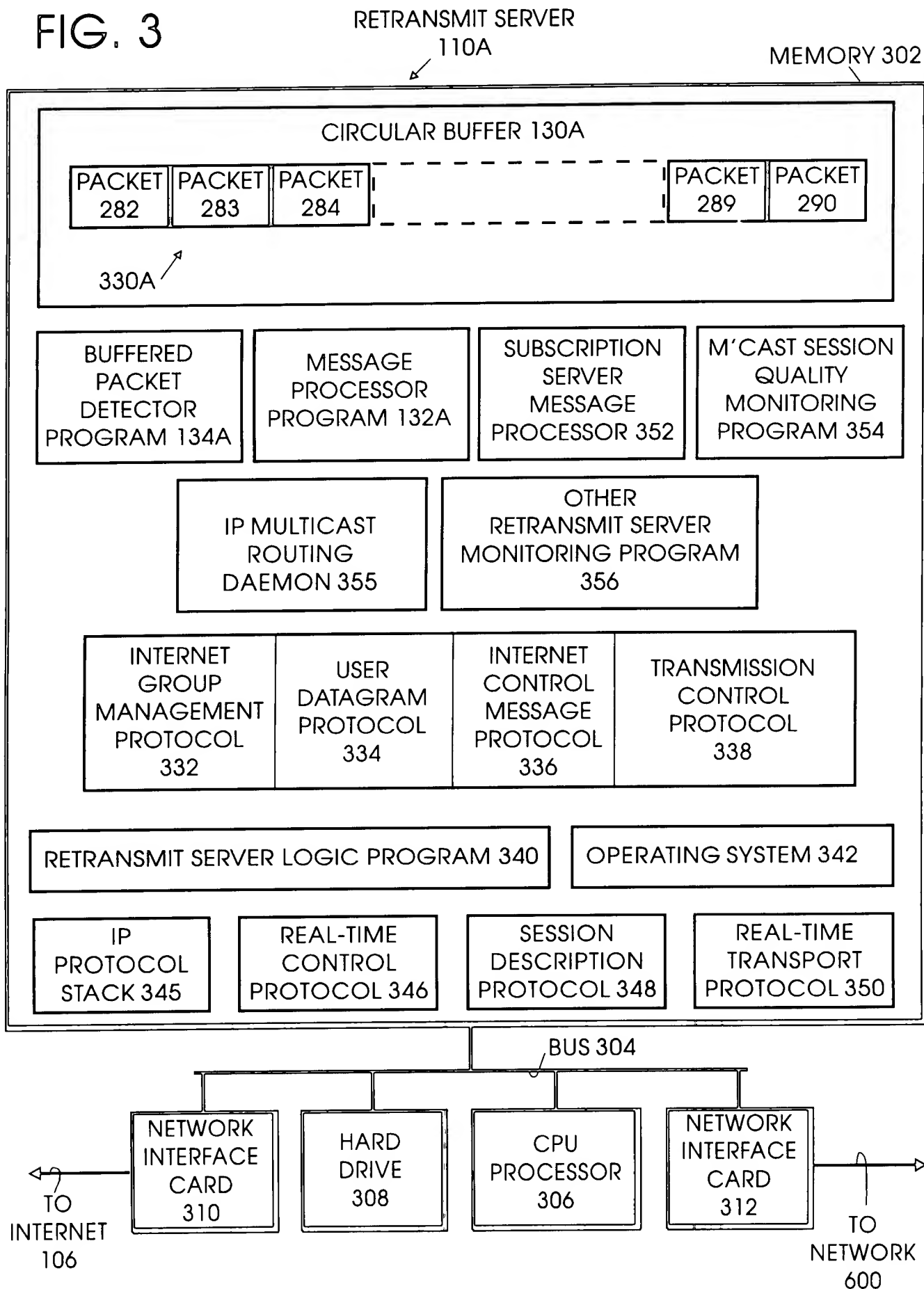


FIG. 3A

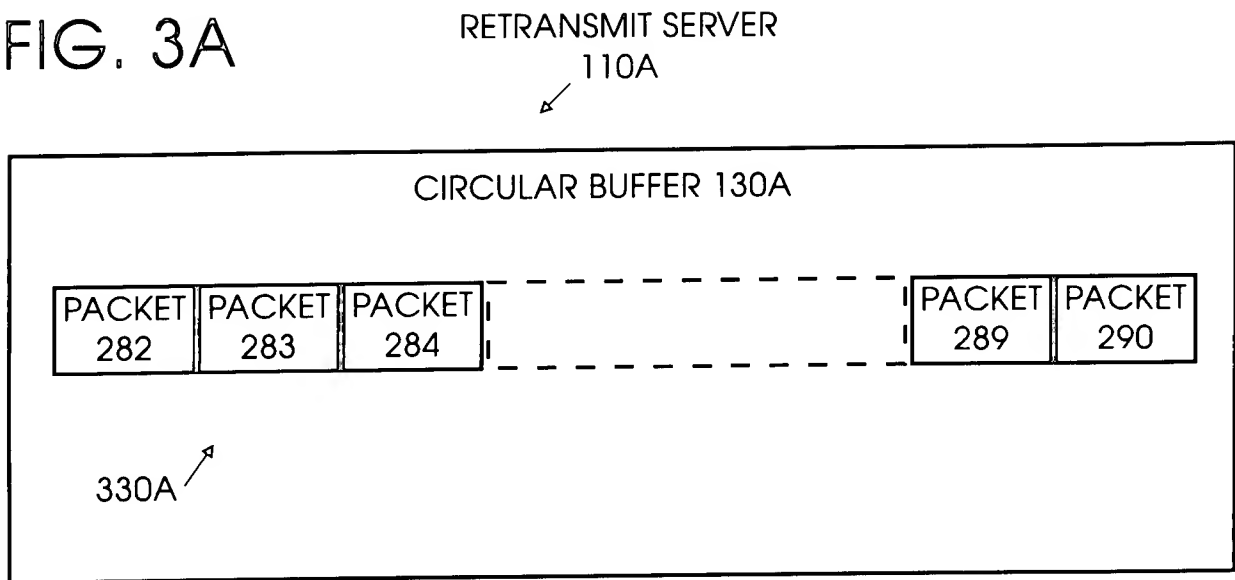


FIG. 3B

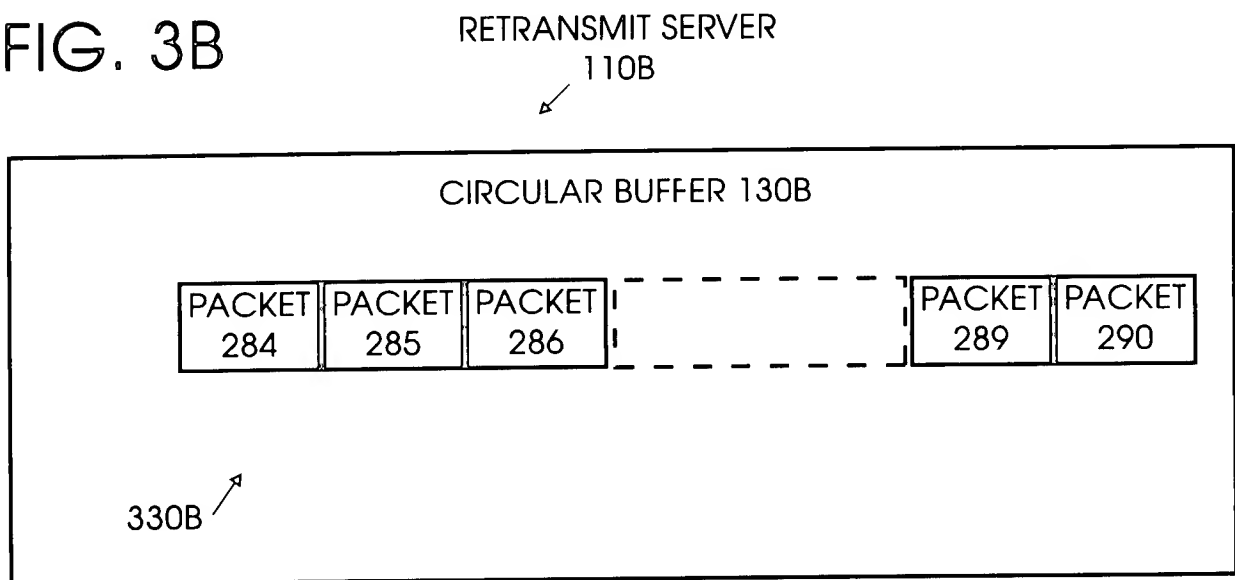


FIG. 3C

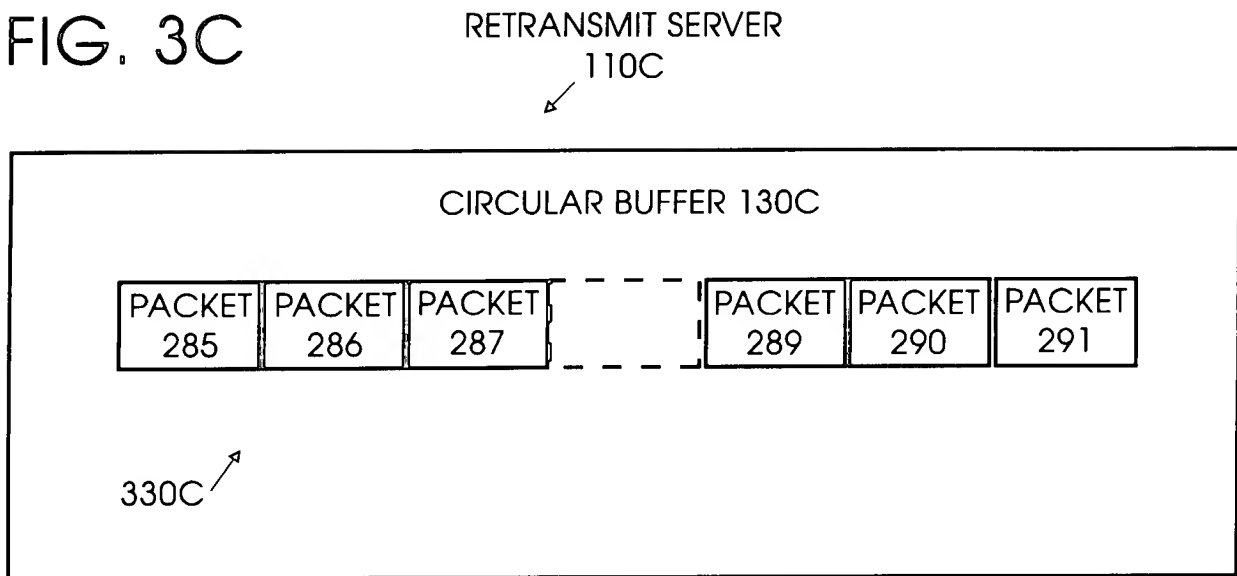


FIG. 3D

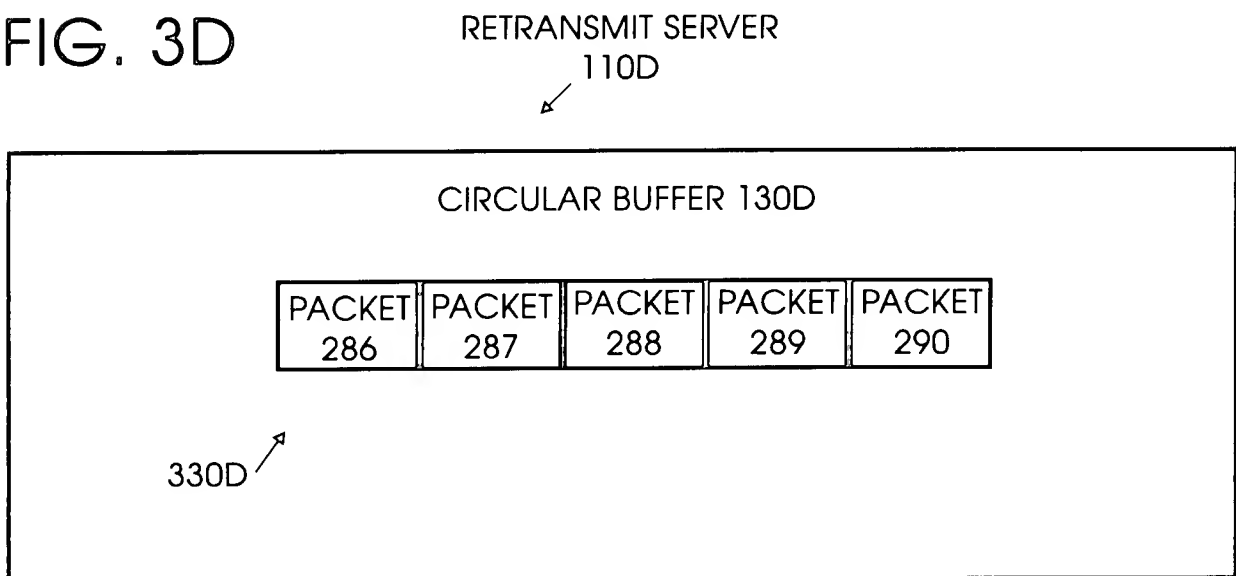


FIG. 3E

RTCP RECEIVER REPORT PACKET PERIODICALLY OUTPUT BY
RETRANSMIT SERVER 110A

PACKET
360A

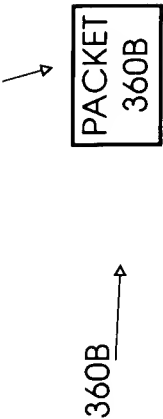
360A →

IP HEADER		UDP HEADER		RTCP RECEIVER REPORT						
SOURCE IP ADDRESS	DEST. IP ADDRESS	SOURCE PORT	DEST. PORT	ORIGINAL SENDER ID	RCVR'S ID	RCVR'S. PACKET COUNT	FRACT'N LOST	TOTAL LOST	INTER- ARRIVAL JITTER	ROUND TRIP DELAY
...	RETRANS. SERVER 110A	MSG. PROC. 132A	MSG. PROC. 142	GROUP_1 SOURCE 102	RETRANS. SERVER 110A	286	286/290	4	0123	0567

→ PACKET 360A

FIG. 3F

RTCP RECEIVER REPORT PACKET PERIODICALLY OUTPUT BY
RETRANSMIT SERVER 110B

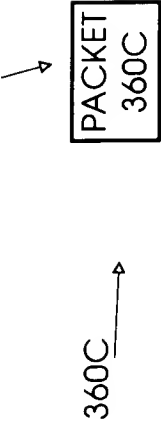


IP HEADER		UDP HEADER		RTCP RECEIVER REPORT						
SOURCE IP ADDRESS	DEST. IP ADDRESS	SOURCE PORT	DEST. PORT	ORIGINAL SENDER ID	RCVR'S ID	RCVR'S. PACKET COUNT	FRACT'N LOST	TOTAL LOST	INTER-ARRIVAL JITTER	ROUND TRIP DELAY
...	RETRANS. SERVER 110B	MSG. PROC. 132B	MSG. PROC. 142	GROUP_1 SOURCE 102	RETRANS. SERVER 110B	285	285/290	5	0125	0569

PACKET 360B

FIG. 3G

RTCP RECEIVER REPORT PACKET PERIODICALLY OUTPUT BY
RETRANSMIT SERVER 110C

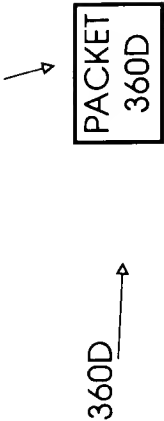


IP HEADER			UDP HEADER		RTCP RECEIVER REPORT							
	SOURCE IP ADDRESS	DEST. IP ADDRESS	SOURCE PORT	DEST. PORT		ORIGINAL SENDER ID	RCVR'S ID	RCVR'S PACKET COUNT	FRACT'N LOST	TOTAL LOST	INTER-ARRIVAL JITTER	ROUND TRIP DELAY
...	RETRANS. SERVER 110C	M'CAST GROUP_1 ADDRESS	MSG. PROC. 132C	MSG. PROC. 142	...	GROUP_1 SOURCE 102	RETRANS. SERVER 110C	284	284/290	6	0127	0571

PACKET 360C

FIG. 3H

RTCP RECEIVER REPORT PACKET PERIODICALLY OUTPUT BY
RETRANSMIT SERVER 110D



IP HEADER			UDP HEADER		RTCP RECEIVER REPORT							
	SOURCE IP ADDRESS	DEST. IP ADDRESS	SOURCE PORT	DEST. PORT		ORIGINAL SENDER ID	RCVR'S ID	RCVR'S. PACKET COUNT	FRACT'N LOST	TOTAL LOST	INTER-ARRIVAL JITTER	ROUND TRIP DELAY
...	RETRANS. SERVER 110D	M'CAST GROUP_1 ADDRESS	MSG. PROC. 132D	MSG. PROC. 142	...	GROUP_1 SOURCE 102	RETRANS. SERVER 110D	283	283/290	7	0129	0573

PACKET 360D

FIG. 4

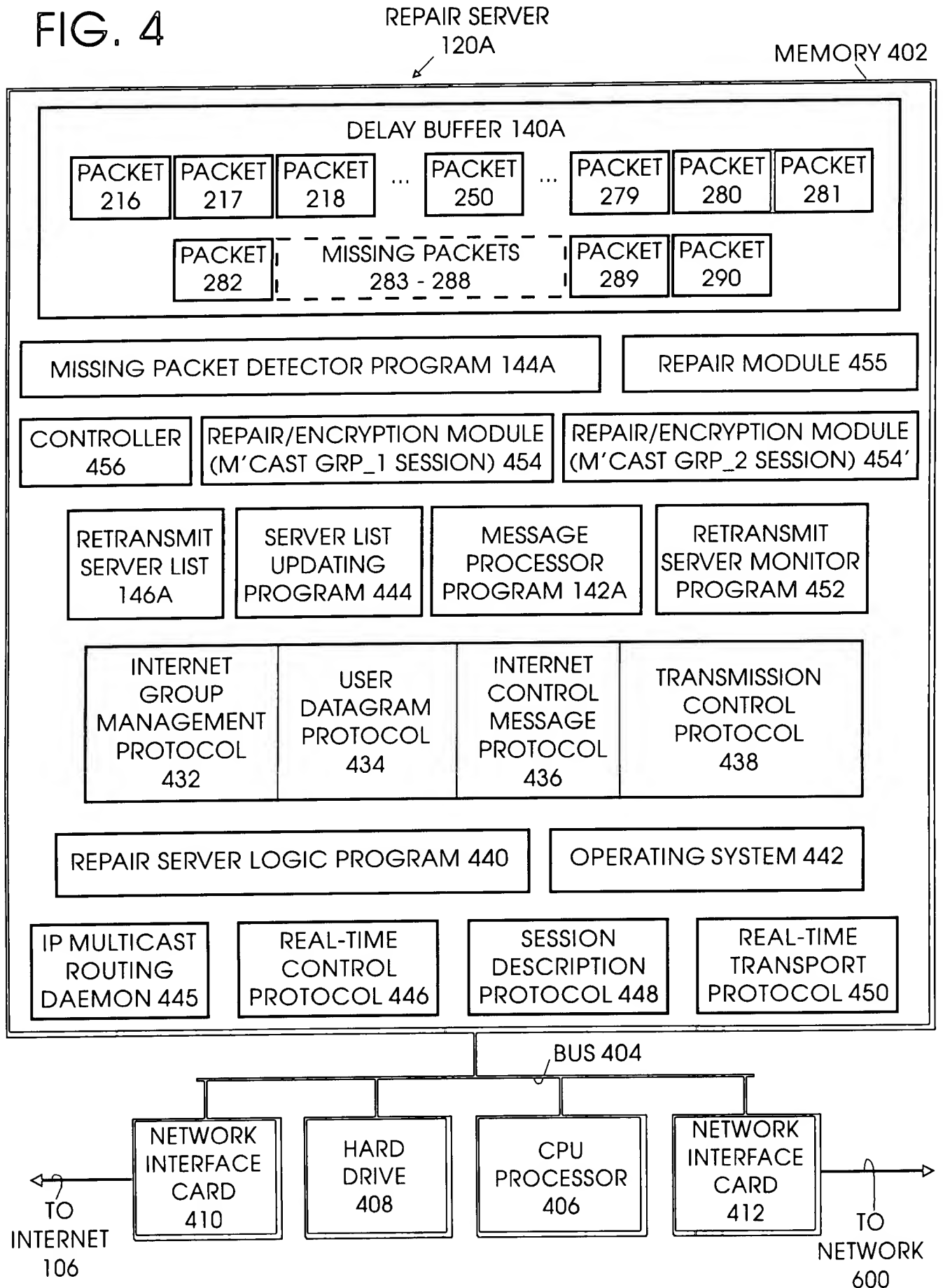
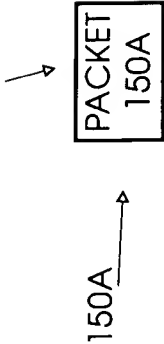


FIG. 4A

UNICAST REQUEST 150A
TO FIRST RETRANSMIT SERVER 110A FOR MISSING PACKETS

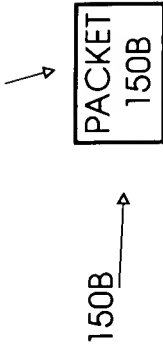


IP HEADER			UDP SEGMENT		REQUEST SEGMENT
o o o	SOURCE IP ADDRESS REPAIR SERVER 120A	DESTINATION IP ADDRESS RETRANS. SERVER 110A	IP OPTIONS	SOURCE PORT MSG. PROC. 142A	DATA
				DEST. PORT CIRC. BUFFER 130A	MISSING SEQUENCE NUMBERS 283 - 288
				o o o	

PACKET 150A

FIG. 4B

UNICAST REQUEST 150B
TO SECOND RETRANSMIT SERVER 110B FOR MISSING PACKETS

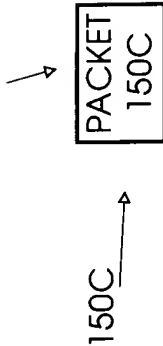


IP HEADER			UDP SEGMENT		REQUEST SEGMENT
SOURCE IP ADDRESS	DESTINATION IP ADDRESS	IP OPTIONS	SOURCE PORT	DEST. PORT	DATA
REPAIR SERVER 120A	RETRANS. SERVER 110B		MSG. PROC. 142A	CIRC. BUFFER 130B	MISSING SEQUENCE NUMBERS 285 - 288

PACKET 150B

FIG. 4C

UNICAST REQUEST 150C
TO THIRD RETRANSMIT SERVER 110C FOR MISSING PACKETS

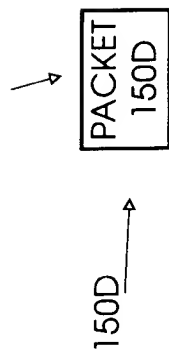


IP HEADER			UDP SEGMENT			REQUEST SEGMENT
ooo	SOURCE IP ADDRESS REPAIR SERVER 120A	DESTINATION IP ADDRESS RETRANS. SERVER 110C	IP OPTIONS			DATA MISSING SEQUENCE NUMBERS 287 - 288
			SOURCE PORT MSG. PROC. 142A	DEST. PORT CIRC. BUFFER 130C	ooo	

PACKET 150C →

FIG. 4D

UNICAST REQUEST 150D
TO FOURTH RETRANSMIT SERVER 110D FOR MISSING PACKETS

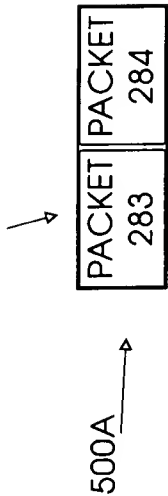


IP HEADER			UDP SEGMENT			REQUEST SEGMENT
ooo	SOURCE IP ADDRESS	DESTINATION IP ADDRESS	SOURCE PORT	DEST. PORT	ooo	DATA
	REPAIR SERVER 120A	RETRANS. SERVER 110D	MSG. PROC. 142A	CIRC. BUFFER 130D		MISSING SEQUENCE NUMBERS 288

← PACKET 150D

FIG. 5A

UNICAST RESPONSE 160A
OF FIRST PORTION OF MISSING PACKETS ON HAND
AT RETRANSMIT SERVER 110A

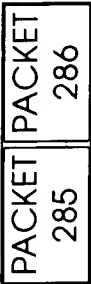


IP HEADER			UDP SEGMENT			RESPONSE SEGMENT
○ ○ ○	SOURCE IP ADDRESS RETRANS. SERVER 110A	DESTINATION IP ADDRESS REPAIR SERVER 120A	SOURCE PORT CIRC. BUFFER 130A	DEST. PORT DELAY BUFFER 140A	SEQUENCE NUMBER 283	DATA

PACKET 283 →

FIG. 5B

UNICAST RESPONSE 160B
OF SECOND PORTION OF MISSING PACKETS ON HAND
AT RETRANSMIT SERVER 110B



IP HEADER			UDP SEGMENT			RESPONSE SEGMENT
o o o	SOURCE IP ADDRESS	DESTINATION IP ADDRESS	SOURCE PORT	DEST. PORT	SEQUENCE NUMBER	DATA
	RETRANS. SERVER 110B	REPAIR SERVER 120A	CIRC. BUFFER 130B	DELAY BUFFER 140A	285	

PACKET 285

FIG. 5C

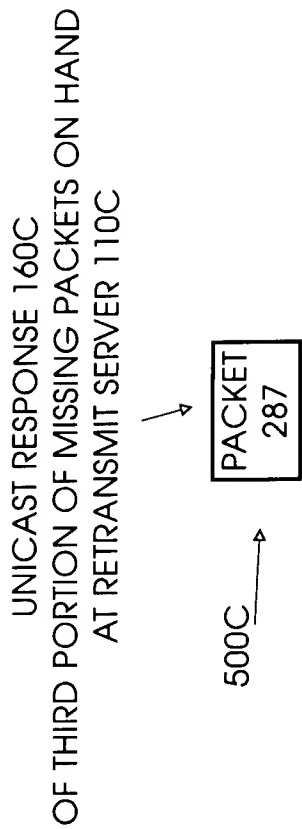
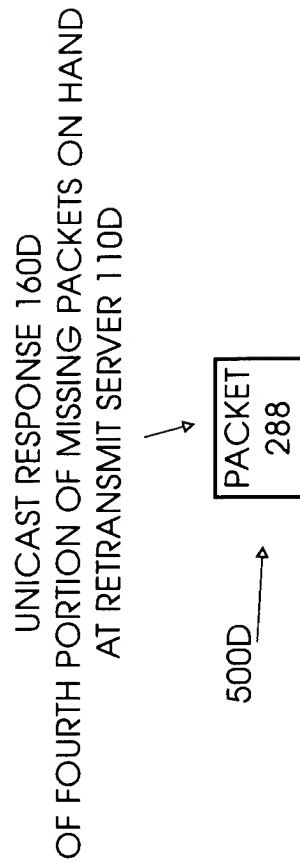


FIG. 5D



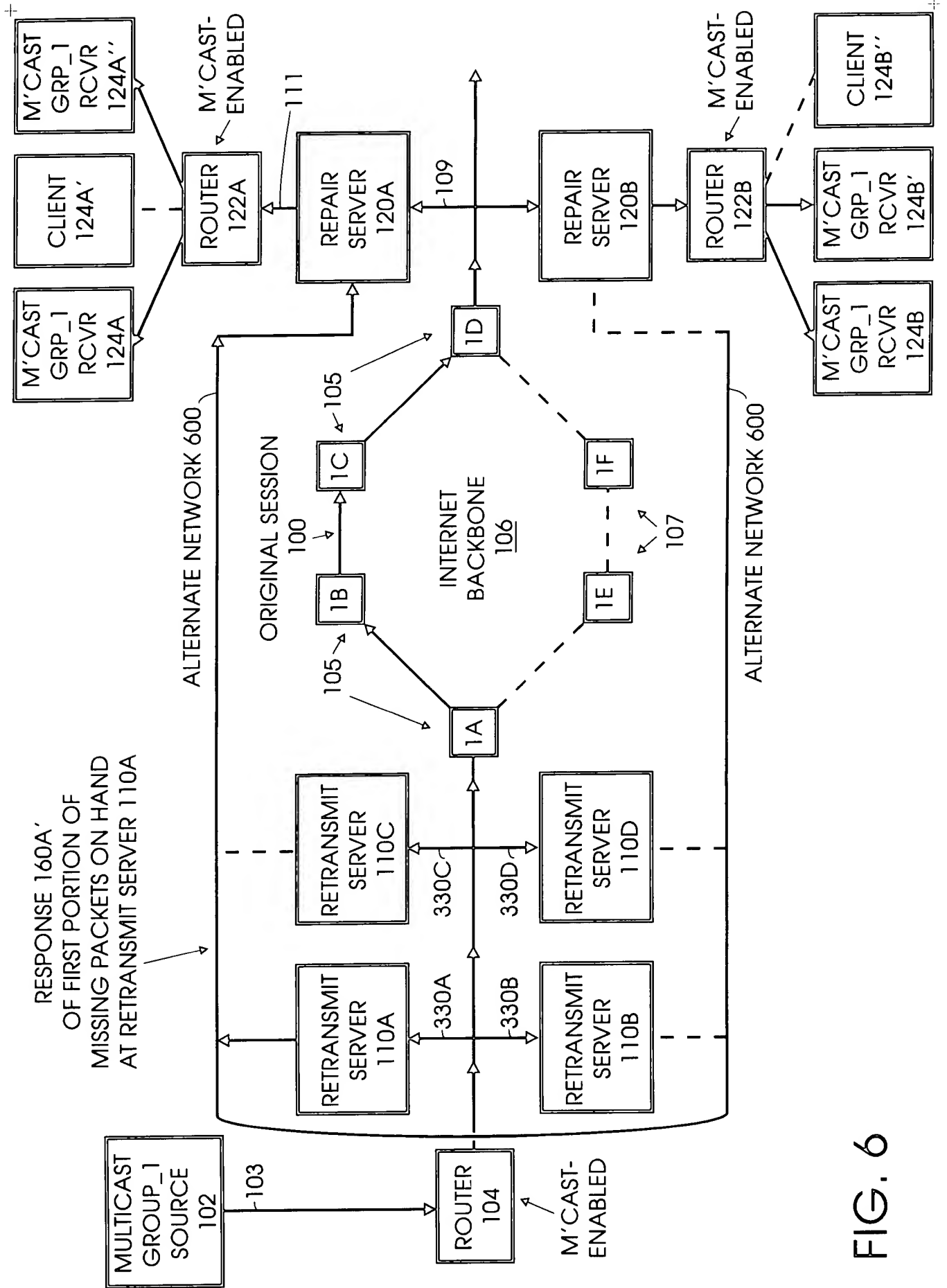


FIG. 6

FIG. 7

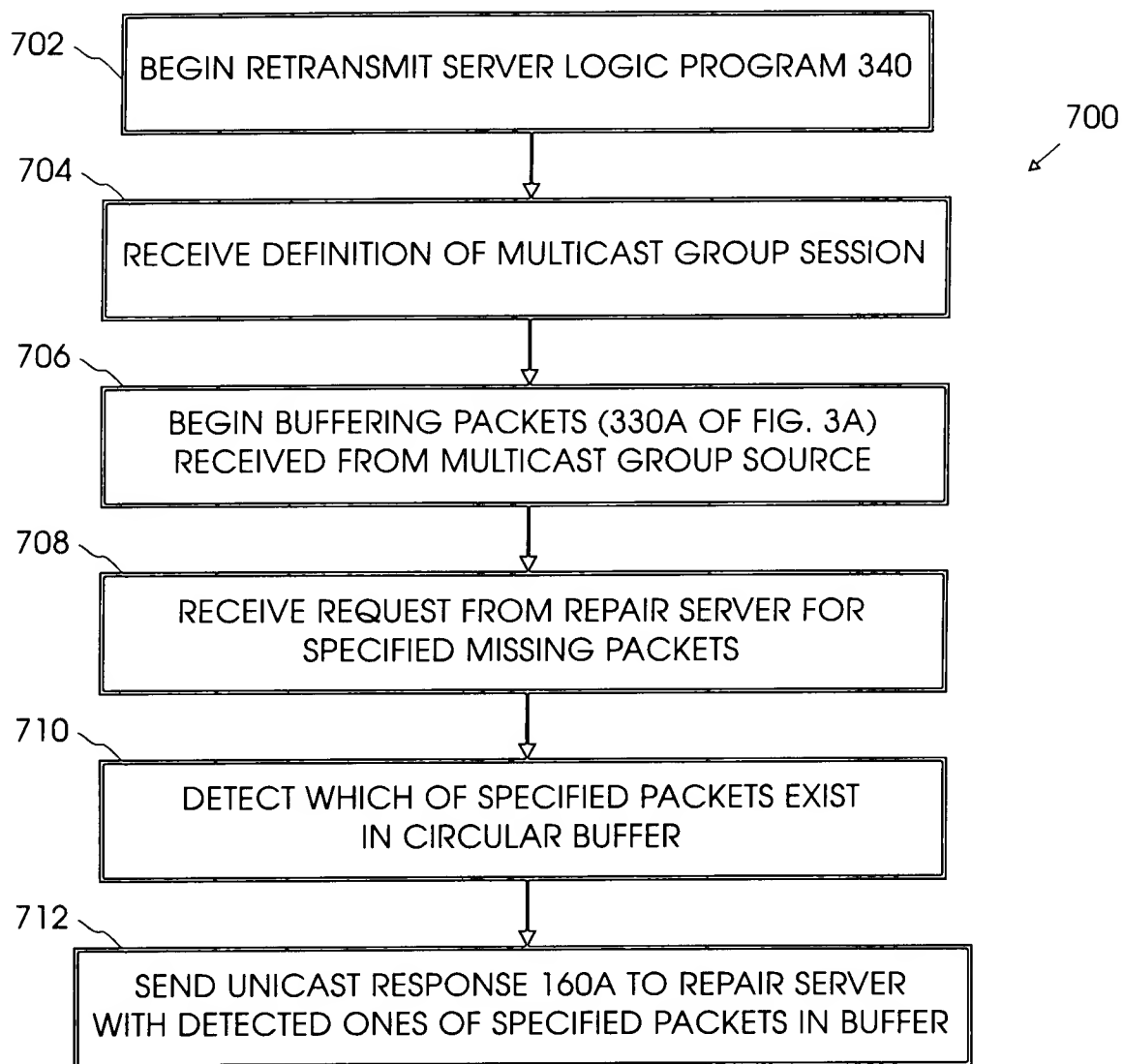


FIG. 8A

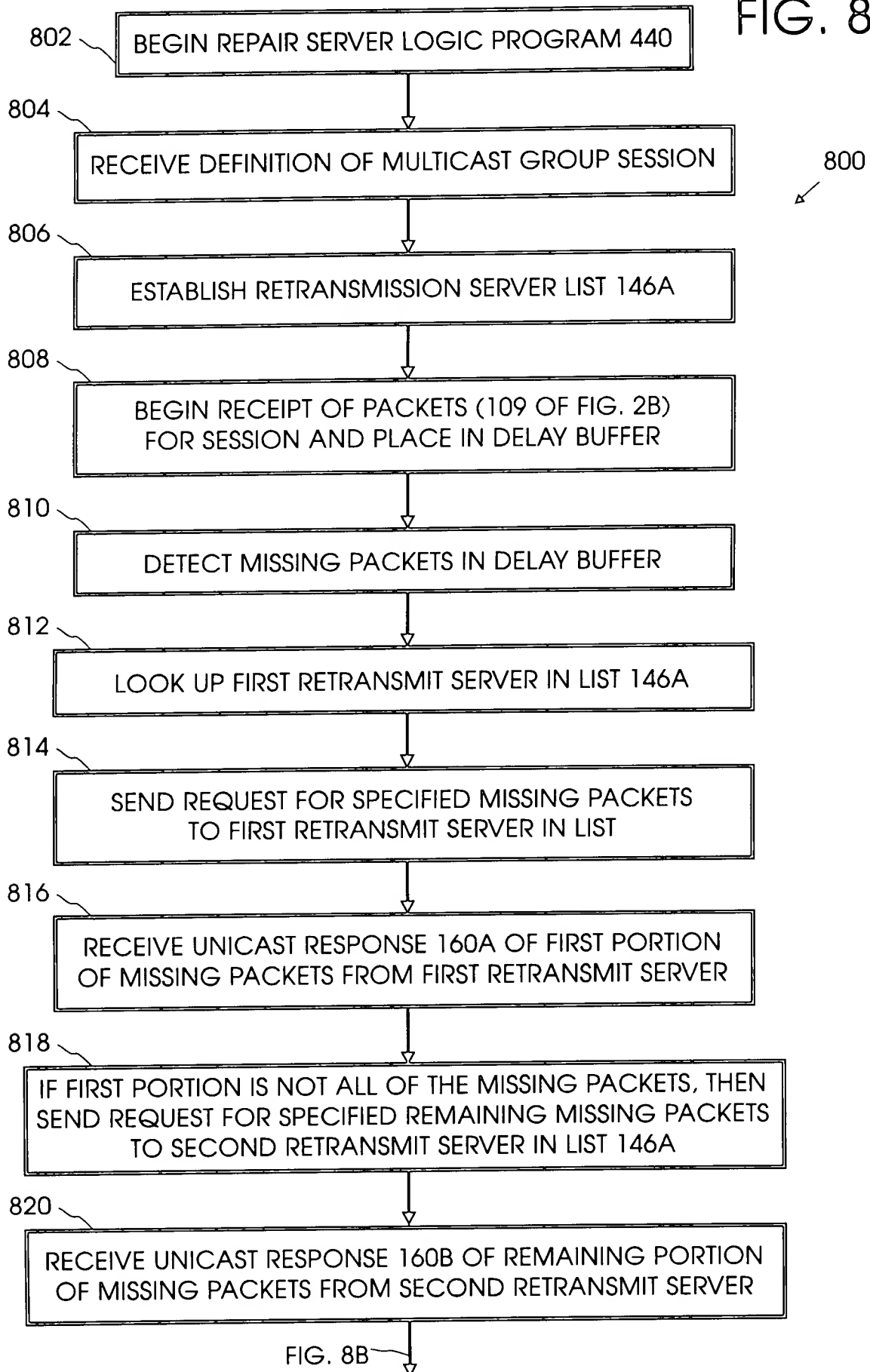


FIG. 8B

800

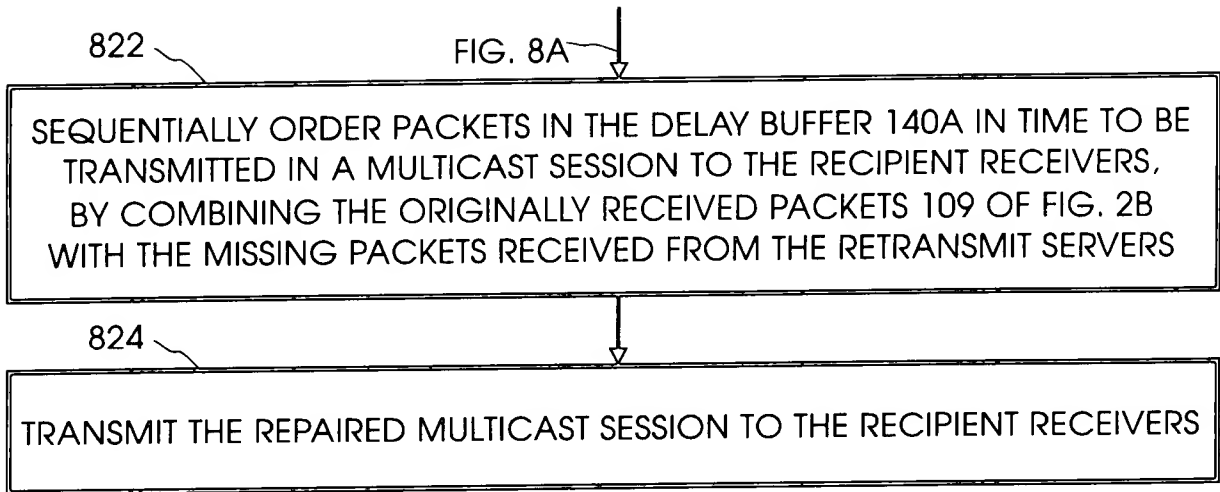


FIG. 9

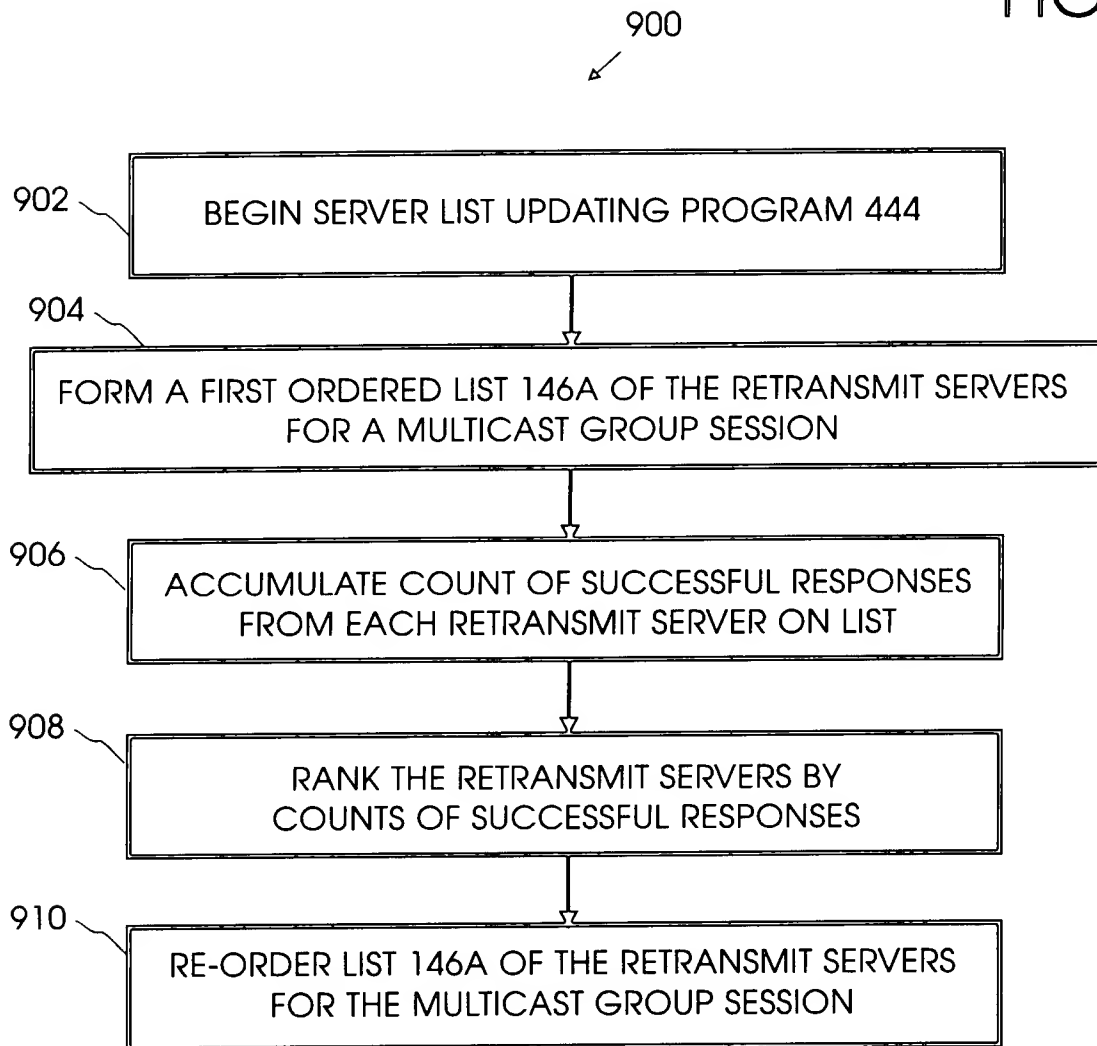


FIG. 9A

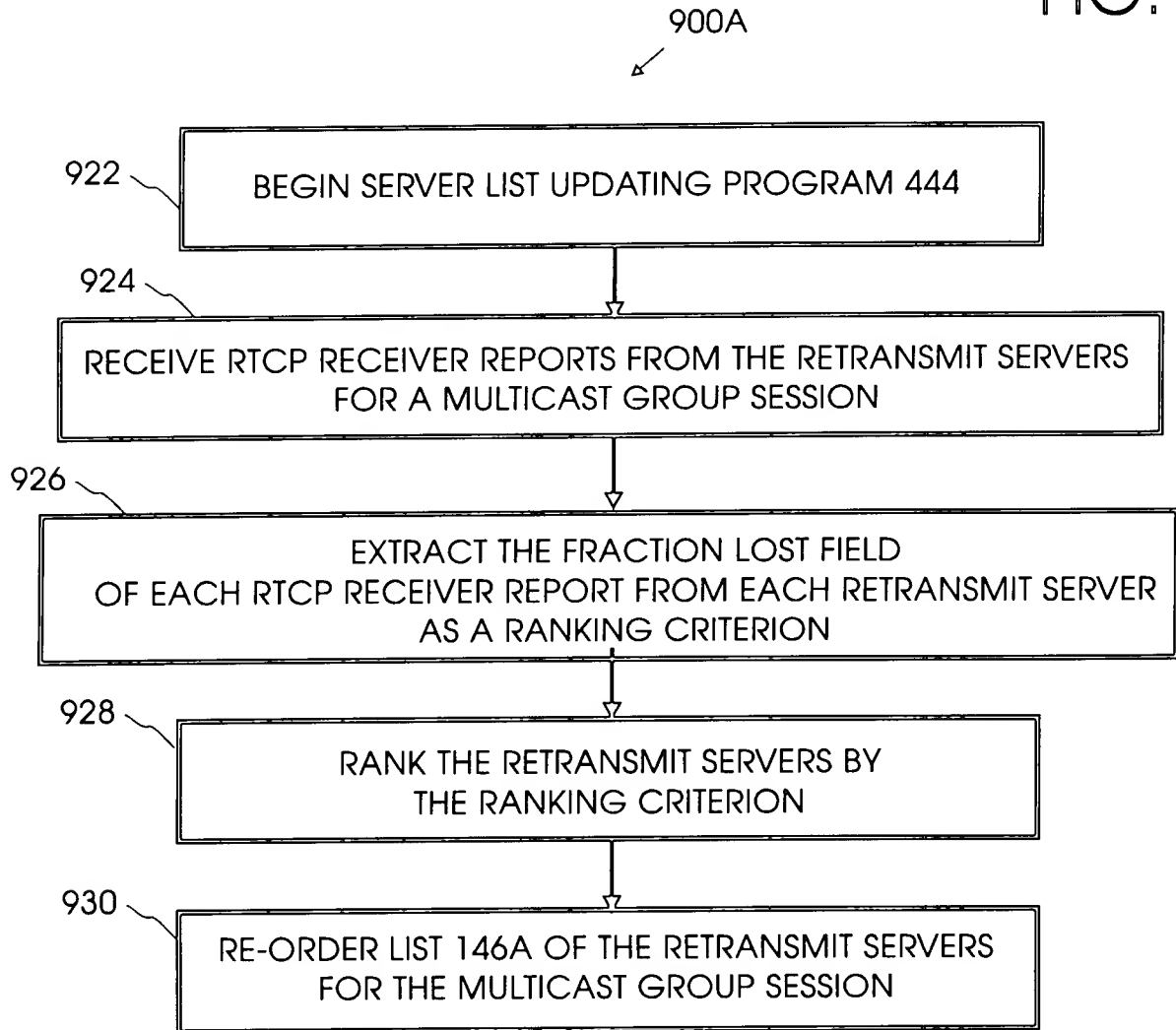


FIG. 9B

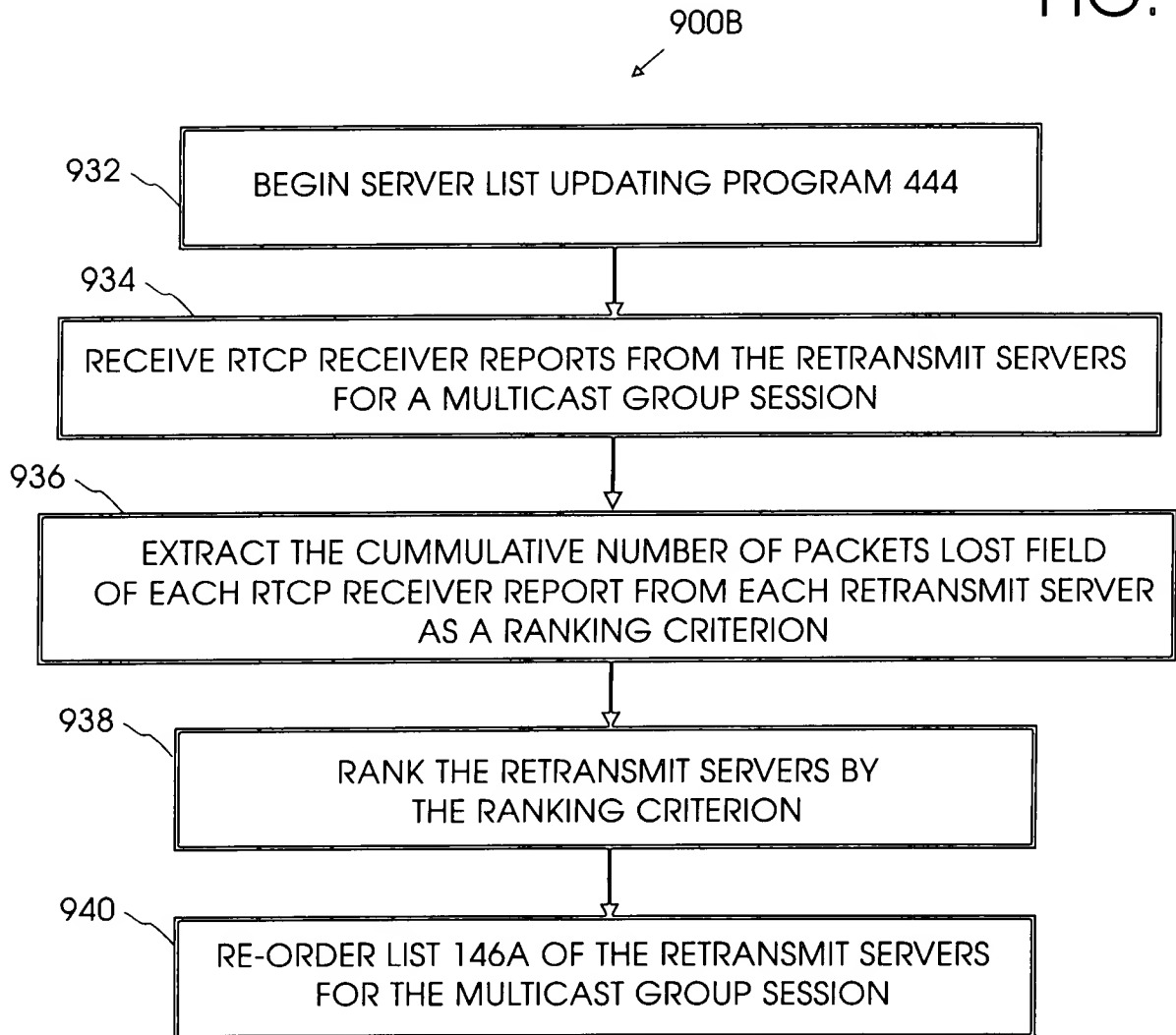


FIG. 9C

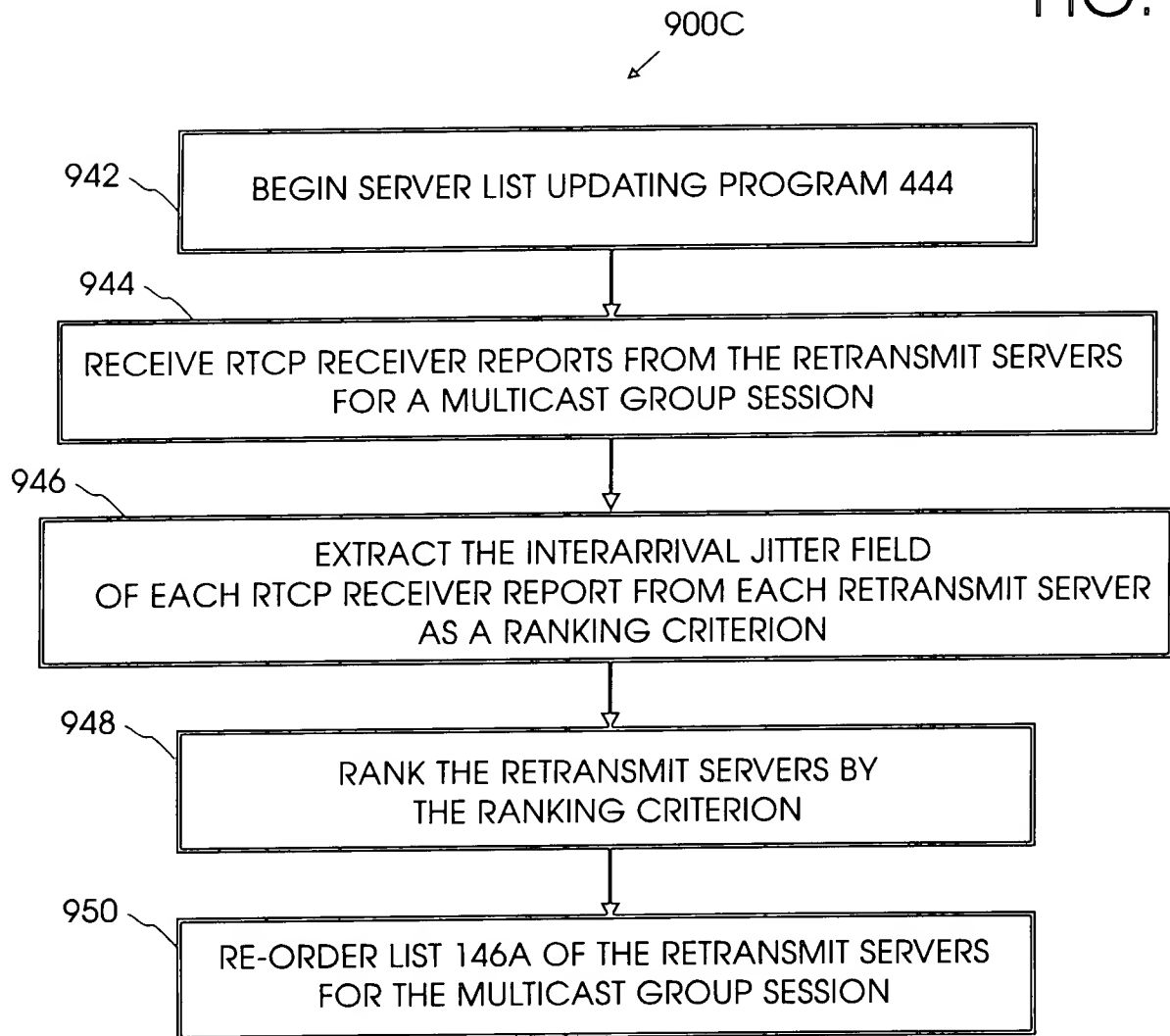


FIG. 9D

